RESEARCH PROJECT SEGMENT

State: Alaska

Name: Sport Fish Investigations of Alaska

Project No.: F-9-7

Study Title: INVENTORY AND CATALOGING

Study No.: G-I

Job Title: Inventory, Cataloging and Population Sampling of the Sport Fish and Sport Fish Waters in Upper Cook Inlet.

Job No.: G-I-D

Period Covered: July 1, 1974 to June 30, 1975.

ABSTRACT

Sixteen lakes were inventoried in the Matanuska-Susitna Valleys for physical and chemical characteristics. Sampled waters, ranging from 9 to 300 acres in size, were of the bicarbonate type and varied from very soft to hard. Water analyses gave mean values for Ca, Mg, K and Na of 11.4, 2.4, 0.9 and 2.0 mg/liter, respectively. Bicarbonate, SO_4 and Cl for these waters averaged 48.0, 2.5 and 1.9 mg/liter. Correlation coefficients between various determinations were: conductance and total alkalinity, 0.99; conductance and total hardness, 0.99; and total hardness and total alkalinity, 0.99. Seasonal thermal and dissolved oxygen patterns are discussed.

Growth and survival as defined by gill net sampling were determined for stocked game fish in 22 lakes. Mean lengths for Winthrop, Washington rainbow trout, *Salmo gairdneri*, after 5.5 months of lake residency, ranged from 155-204 mm; and after 16.5 months of lake residency they ranged from 258-328 mm. Rainbow trout from Ennis, Montana exhibited poor survival during their second year of growth. Gill net data are also presented for coho salmon, *Oncorhynchus kisutch*, and Arctic grayling, *Thymallus arcticus*.

Potential use of the morphoedaphic index as an indicator of productivity in freshwater lakes is discussed.

Data are presented on selectivity of various type gill nets and electroshocking equipment presently being used to evaluate relative growth and survival rates of game fish in stocked lakes.

Chinook salmon, *O. tshawytscha*, escapement surveys were conducted on 15 streams from July 24-August 5, 1974. The 1974 escapement counts were substantially lower than the 1973 enumerations but were comparable with counts prior to the high escapements that occurred during 1973.

Foot surveys were conducted on six streams to enumerate spawning coho salmon.

RECOMMENDATIONS

Emphasis should be directed toward the following activities:

1. Catalog chemical and physical parameters of lakes in the area and determine growth and relative survival of salmonids in these waters.

2. Evaluate various sampling techniques that are presently employed in the area.

3. Determine chinook and coho salmon escapements in selected streams of the area and evaluate returns of hatchery chinook to Willow Creek.

4. Expand coho salmon research in the Susitna River basin to assess fish wheels as a method of determining escapements and summarize all existing data in the Cook Inlet area.

OBJECTIVES

1. To determine and record the environmental characteristics of certain potential fishery waters of the job area and to develop and evaluate plans for the enhancement of resident fish stocks.

2. To assist as required in the investigation of public access status to the area's fishing waters and to make specific recommendations for selection of sites for segregation.

3. To make recommendations for the proper management of various sport fish waters in the area and to direct future studies.

TECHNIQUES USED

Techniques for collection and analysis of water samples are identical to those described by Engel (1974). Water samples were shipped to the U.S. Geological Survey, Salt Lake City, Utah, where the analytical work was performed following procedures described by Brown et. al (1970).

Chemical milliequivalents per liter were computed by multiplying the reported concentration of the individual constituents, in milligrams per liter by the reciprocal of their combined weights.

Monofilament gill nets (125'X6') with five mesh sizes were used to collect fish specimens. Nets were normally set for approximately 24 hrs in each lake. These gill nets differed in their mesh sizes and monofilament diameters, therefore catches were segregated to evaluate selectivity of the different net types.

Fish shocking was conducted with a boat mounted electroshocking unit, described in detail by Kalb (1974).

The age of planted salmonids was determined, when necessary, by examination of scales pressed between glass slides. Fork lengths were recorded to the nearest millimeter and weights to the nearest 0.01 lb.

Chinook spawning populations were enumerated by aerial, boat and streambank surveys. Chinook carcasses were measured for fork length and examined for sex and adipose clips.

Coho spawning populations were enumerated by foot surveys within established index areas.

A temporary weir was located on Fish Creek immediately downstream from the Goose Bay-Wasilla Highway culvert. The weir was operated from July 8-September 6 to enumerate all salmon species entering the Fish Creek system. The weir, constructed by the Commercial Fish Division, was described by Watsjold (1974).

FINDINGS

Limnological Studies

Introduction:

In 1973 a limnological inventory of stocked lakes was initiated by Engel (1974), with an objective of establishing indices of productivity for lakes in the Matanuska-Susitna Valleys. During this job segment the inventory was expanded to include other lakes with management potential. In addition thermal and dissolved oxygen patterns were also monitored in several of the 1973 study lakes to assess seasonal and yearly variations.

The physical and climatological features of the Matanuska-Susitna Valleys have been previously described by Engel (1974).

Physical Characteristics of the Lakes:

Morphometric features of 16 lakes are presented in Table 1. The lakes range in surface area from 9 to 300 acres, and from 23'-170' in depth. Byers and Milo # 1 Lakes have permanent outlets while the others are landlocked or have intermittent outlet discharge. All but two lakes, Twelvemile and Wishbone, are located on the Valley floors below 850 ft elevation.

Monitoring of monthly temperatures in 11 lakes began in 1973 and was continued on nine lakes throughout the summer of 1974. Vertical temperature series, with the date of observation, are shown in Table 2. As was found during the previous year, lakes deeper than 6 m were thermally stratified for at least a portion of the summer.

Lakes in the Palmer area became ice-free (May 2-6) which was identical to the timing of ice-out occurring in 1973. Comparison of surface temperatures revealed a similar seasonal pattern for all lower elevation lakes (Figure 1). Surface temperatures during the 1974 season averaged 2°F-4°F warmer than those recorded the previous year. A maximum surface temperature of 72°F was recorded on Lucille Lake in July. Ice formation on Valley lakes did not occur until the first week in November, the latest freeze-up observed during recent years.

Table 1. Morphometric Data for Selected Lakes of the Matanuska-Susitna Valleys, 1974.

Lake	Surface Acres	Maximum Depth (ft)	Elevation (ft)	Location (SM)
Falk	16	45	100	T17N R2E Sec. 14
Junction	13	45	100	T17N R1W Sec. 15
Kiarre	9	23	100	T17N R1E Sec. 14
High Ridge	40	--	100	T17N R1E Sec. 12
Bairds	55	30	100	T17N R1E Sec. 12
Seventeenmile	101	40	650	T19N R3E Sec. 19
Benka	115	41	550	T24N R4W Sec. 9 and 12
Wishbone	60	25	1,600	T19N R2E Sec. 24
Byers	300	170	815	T31N R5W Sec. 36
Tigger	23	28	350	T25N R4W Sec. 5
Carpenter	115	30	140	T16N R4W Sec. 32
Milo # 1	109	110	208	T18N R5W Sec. 12
Big No Luck	68	40	245	T18N R5W Sec. 13
Chicken	138	60	230	T18N R5W Sec. 24
Prator	98	24	295	T18N R3W Sec. 25
Twelvemile	56	35	1,498	T19N R2W Sec. 6

Table 2. Vertical Distribution of Temperatures in Matanuska-Susitna Valley Lakes, 1974.

	Low Elevation Lakes*									High Elevation Lakes**		
Depth (m)	Matanuska 8/5	Christiansen 7/30	Long[a] 8/5	Johnson 8/6	Marion 7/29	Memory 8/6	Lucille 7/30	Seymour 7/29	Loon 7/29	Long[b] 7/25	Lower Bonnie 7/25	Ravine 7/25
0	66	64	65	65	65	66	65	66	66	58	58	58
1	66	64	65	65	65	66	65	66	66	58	58	58
2	65	64	65	65	65	66	65	65	65	58	58	58
3	65	64	65	65	65	66	64	64	64	58	58	58
4	65	64	64	65	65	65	62	64	63	58	58	58
5	65	64	64	64	65	64	60	64	63	58	58	58
6	62	62	63	61	64	64	--	--	--	57	57	58
7	62	56	58	54	64	--	--	--	--	57	57	--
8	54	51	54	51	63	--	--	--	--	57	57	--
9	50	48	50	47	61	--	--	--	--	56	50	--
10	42	47	47	44	57	--	--	--	--	52	45	--
11	39	44	46	42	55	--	--	--	--	48	--	--
12	39	42	45	41	54	--	--	--	--	45	--	--
13	39	41	44	41	54	--	--	--	--	44	--	--
14	39	40	43	--	--	--	--	--	--	42	--	--
15	39	40	42	--	--	--	--	--	--	41	--	--
16	39	39	42	--	--	--	--	--	--	40	--	--
17	39	39	42	--	--	--	--	--	--	--	--	--
18	39	39	--	--	--	--	--	--	--	--	--	--
19	39	39	--	--	--	--	--	--	--	--	--	--
20	39	39	--	--	--	--	--	--	--	--	--	--
21	39	39	--	--	--	--	--	--	--	--	--	--
22	39	39	--	--	--	--	--	--	--	--	--	--
23	39	--	--	--	--	--	--	--	--	--	--	--
24	39	--	--	--	--	--	--	--	--	--	--	--
25	39	--	--	--	--	--	--	--	--	--	--	--

* Elevation less than 500 feet.
** Elevation over 1,000 feet.

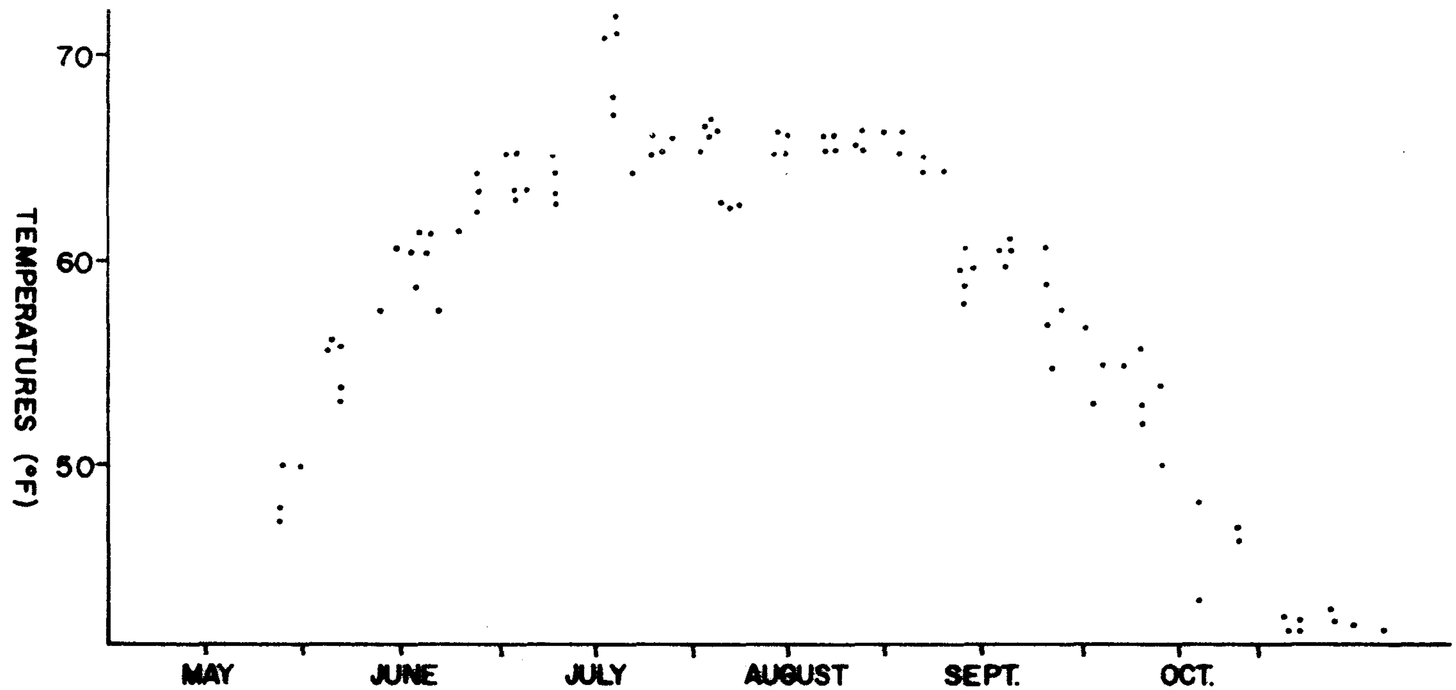

Figure 1. Surface Water Temperatures of Nine Matanuska-Susitna Valley Lakes, 1974.

Although most deep lakes are dimictic, some do not mix completely during each circulation period. In 1974, as in 1973, vernal mixing was incomplete in Christiansen and Matanuska Lakes. During the fall, however, they mixed completely due to the lateness of ice cover and frequent winds before formation of ice cover. This was the first time since the fall of 1972 that complete mixing was evident in Matanuska Lake.

Thermal conditions of three mountainous lakes (Lower Bonnie, Ravine and Long) did not receive detailed study. However, data collected on July 25 indicate that their surface water temperatures were 6°F-8°F cooler than those lakes near Palmer.

Chemical Characteristics:

A single sample, collected 1 m below the surface, was obtained from each of 16 lakes on June 10 and 11 to compare chemical properties (Table 3).

All waters were of the bicarbonate type, characterized by a predominance of Ca among the cations (with the exception of Prator and Twelvemile Lakes), and HCO_3 among anions. The percentage of cations, as calculated from reactive weights, varied from 31.3%-71.9% for Ca, 9.8%-30.9% for Mg, 1.1%-10.4% for K, and 4.7%-40.8% for Na. Of the anions, HCO_3 ranged from 63.0%-91.7%, SO_4 from 2.5%-19.1% and Cl from 2.6%-20.9%. Carbonate was evident only in High Ridge Lake. Summer pH of surface waters ranged from 6.7 to 8.5.

Prator and Twelvemile Lakes had a dominance of sodium. Percentage of cations for Prator and Twelvemile Lakes, respectively, were 31.3% and 39.5% for Ca, 22.3% and 11.8% for Mg, 7.1% and 7.9% for K, 39.3% and 40.8% for Na. Bicarbonate levels were 67.3% for Prator Lake and 76.3% for Twelvemile Lake.

Ionic composition of the sampled waters are compared to worldwide averages in Table 4. Cation components compared favorably with world averages but among the anions, bicarbonate was substantially higher and sulfate lower than values listed by Ruttner (1953).

The 16 lakes were ranked in a high-to-low order with respect to conductance, total hardness and total alkalinity (Table 5). As in 1973 significant correlations existed between specific conductance and total hardness (r=0.99), specific conductance and total alkalinity (r=0.99), and total hardness and total alkalinity (r=0.99) for the 16 bodies of water.

Since strong linear relationships exist between the three chemical properties for the 1973 and 1974 analyses, the data from both years were combined and recomputation of correlation coefficients for the combined data again revealed significant correlations existing between each of the three relationships (r=0.99). Regression analyses of these three measurements for 38 lakes permits a reasonable estimation of the unknown determination when only one has been analyzed (Figure 2). Substantial deviation from the line of best fit suggest abnormal levels of one or more other ions. The 1973 analysis revealed such a deviation in three mountainous lakes. They contained unusually high sodium levels which raised conductance above the expected for recorded alkalinity and hardness.

Table 3. Ionic Composition of 16 Matanuska-Susitna Valley Lakes, 1974.

Lake	Cations					Anions			
	Ca	Mg	K	Na	Total meq/liter	HCO_3	SO_4	Cl	Total meq/liter
Junction									
mg/liter	32.0	7.8	1.0	3.1	-----	135.0	5.7	3.4	-----
meq/liter	1.597	0.642	0.026	0.135	2.400	2.213	0.119	0.096	2.428
% of total*	66.5	26.8	1.1	5.6	-----	91.1	4.9	4.0	-----
Falk									
mg/liter	34.0	5.0	4.2	3.3	-----	128.0	8.1	3.6	-----
meq/liter	1.697	0.412	0.108	0.144	2.361	2.098	0.169	0.102	2.369
% of total	71.9	17.4	4.6	6.1	-----	88.6	7.1	4.3	-----
Klaire									
mg/liter	33.0	5.6	2.3	3.5	-----	132.0	3.5	4.3	-----
meq/liter	1.647	0.461	0.059	0.153	2.320	2.164	0.073	0.122	2.359
% of total	71.0	19.9	2.5	6.6	-----	91.7	3.1	5.2	-----
High Ridge									
mg/liter	22.0	7.2	1.2	4.5	-----	100.0	2.9	7.0	-----
meq/liter	1.098	0.593	0.031	0.196	1.918	1.639	0.061	0.198	1.898**
% of total	57.3	30.9	1.6	10.2	-----	86.4	3.2	10.4	-----
Bairds									
mg/liter	26.0	4.9	1.3	2.5	-----	108.0	4.8	3.1	-----
meq/liter	1.298	0.404	0.034	0.109	1.845	1.770	0.100	0.088	1.958
% of total	70.4	21.9	1.8	5.9	-----	90.4	5.1	4.5	-----

Table 3. (Cont.) Ionic Composition of 16 Matanuska-Susitna Valley Lakes, 1974.

	Cations					Anions			
Lake	Ca	Mg	K	Na	Total meq/liter	HCO_3	SO_4	Cl	Total meq/liter
Seventeenmile									
mg/liter	6.5	1.7	0.4	4.5	-----	35.0	3.0	0.6	-----
meq/liter	0.325	0.140	0.011	0.196	0.672	0.574	0.063	0.017	0.654
% of total	48.4	20.8	1.6	29.2	-----	87.8	9.6	2.6	-----
Benka									
mg/liter	4.6	1.2	0.4	1.3	-----	22.0	1.8	0.8	-----
meq/liter	0.230	0.099	0.011	0.057	0.397	0.361	0.038	0.023	0.422
% of total	57.9	24.9	2.8	14.4	-----	85.5	9.0	5.5	-----
Wishbone									
mg/liter	4.3	1.0	0.4	2.2	-----	24.0	1.1	0.9	-----
meq/liter	0.215	0.083	0.011	0.096	0.405	0.393	0.023	0.026	0.442
% of total	53.1	20.5	2.7	23.7	-----	88.9	5.2	5.9	-----
Byers									
mg/liter	5.9	0.5	0.7	1.7	-----	18.0	1.6	0.8	-----
meq/liter	0.295	0.042	0.018	0.074	0.429	0.295	0.034	0.023	0.352
% of total	68.8	9.8	4.2	17.2	-----	83.8	9.7	6.5	-----
Tigger									
mg/liter	3.6	0.7	0.4	1.8	-----	19.0	1.3	1.1	-----
meq/liter	0.180	0.058	0.011	0.079	0.328	0.311	0.028	0.032	0.371
% of total	54.9	17.7	3.3	24.1	-----	83.8	7.6	8.6	-----
Carpenter									
mg/liter	3.4	0.6	0.4	1.3	-----	15.0	0.3	0.9	-----
meq/liter	0.170	0.050	0.011	0.057	0.288	0.246	0.007	0.026	0.279
% of total	59.0	17.4	3.8	19.8	-----	88.2	2.5	9.3	-----

Table 3. (Cont.) Ionic Composition of 16 Matanuska-Susitna Valley Lakes, 1974.

Lake	Cations					Anions			
	Ca	Mg	K	Na	Total meq/liter	HCO_3	SO_4	Cl	Total meq/liter
Milo # 1									
mg/liter	1.4	0.4	0.4	0.8	-----	9.0	2.0	1.6	-----
meq/liter	0.070	0.033	0.011	0.035	0.149	0.148	0.045	0.042	0.235
% of total	47.0	22.1	7.4	23.5	-----	63.0	19.1	17.9	-----
Big No Luck									
mg/liter	2.6	0.4	0.5	0.4	-----	7.4	1.3	0.7	-----
meq/liter	0.130	0.033	0.013	0.018	0.194	0.121	0.028	0.020	0.169
% of total	67.0	17.0	6.7	9.3	-----	71.6	16.6	11.8	-----
Chicken									
mg/liter	1.3	0.3	0.4	0.1	-----	7.2	1.1	0.6	-----
meq/liter	0.065	0.025	0.011	0.005	0.106	0.118	0.023	0.017	0.158
% of total	61.3	23.6	10.4	4.7	-----	74.7	14.5	10.8	-----
Prator									
mg/liter	0.7	0.3	0.3	1.0	-----	4.5	0.6	0.8	-----
meq/liter	0.035	0.025	0.008	0.044	0.112	0.074	0.013	0.023	0.110
% of total	31.3	22.3	7.1	39.3	-----	67.3	11.8	20.9	-----
Twelvemile									
mg/liter	0.6	0.1	0.2	0.7	-----	3.7	0.6	0.2	-----
meq/liter	0.030	0.009	0.006	0.031	0.076	0.061	0.013	0.006	0.080
% of total	39.5	11.8	7.9	40.8	-----	76.3	16.2	7.5	-----
Average									
mg/liter	11.4	2.4	0.9	2.0	-----	48.0	2.5	1.9	-----
% of total	57.9	20.3	4.3	17.5	-----	82.4	9.1	8.5	-----

* Percentage based on reactive weight (meq/liter).
** 1.9 meq/liter carbonate was also present.

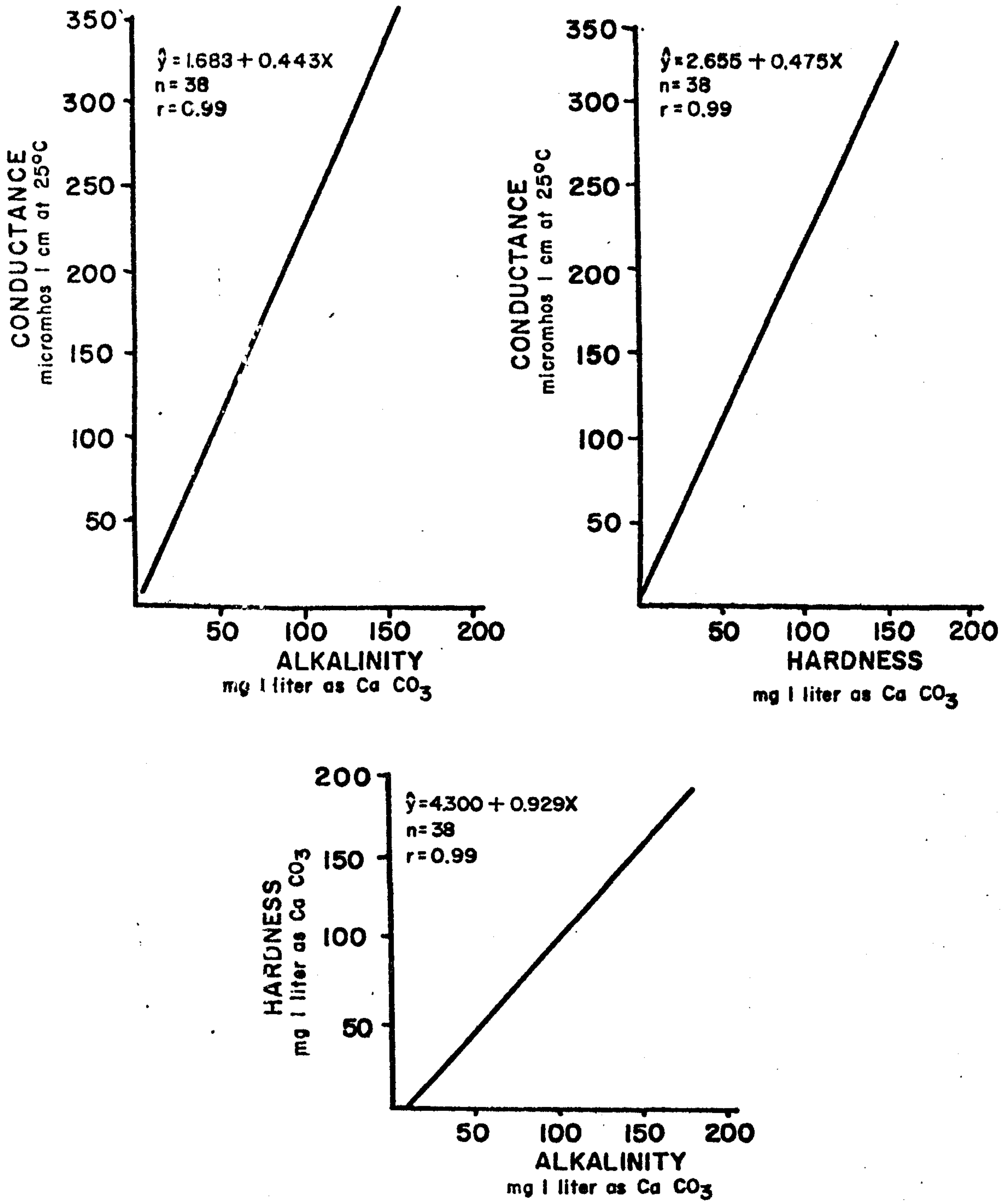

Figure 2. Regression of Total Alkalinity and Total Hardness on Conductance and Total Alkalinity on Total Hardness for 38 Matanuska-Susitna Valley Lakes.

Table 4. Comparison of Ionic Composition of 16 Matanuska-Susitna Valley Lakes with World Averages.

Lake	Percentage*						
	Cations				Anions		
	Ca	Mg	K	Na	HCO_3	SO_4	Cl
Mat-Su Valley	61	20	4	15	83	8	9
Worldwide	64	17	3	16	74	16	10

*Based on reactive weights (meq/liter).

Table 5. Chemical Analyses of Selected Lakes of the Matanuska-Susitna Valleys, 1974*.

Lake	Specific Conductance (micromhos/cm at 25°C)	Total Hardness (mg/liter as $CaCO_3$)	Total Alkalinity (mg/liter as $CaCO_3$)
Junction	234	110	111
Falk	234	110	105
Klaire	219	110	108
High Ridge	193	85	85
Bairds	184	85	89
Seventeenmile	65	23	29
Benka	41	16	18
Wishbone	41	15	20
Byers	36	17	15
Tigger	34	12	16
Carpenter	29	11	12
Milo # 1	19	5	7
Fip No Luck	17	8	6
Chicken	14	4	6
Prator	11	3	4
Twelvemile	10	2	3

*Analyses performed by U. S. Geological Survey.

Seasonal chemical variations were monitored on a monthly basis in Lucille and Matanuska Lakes. As expected, alkalinity, hardness and conductance varied considerably depending on the time of year (Table 6). The highest values occurred under ice cover from November through April and the lowest were recorded during the May through August period.

Table 6. Seasonal Chemical Characteristics* of the Surface Waters of Two Matanuska-Susitna Valley Lakes, 1974.

Lake	Total Alkalinity mg/liter as $CaCO_3$		Total Hardness mg/liter as $CaCO_3$		pH		Specific Conductance (micromhos/cm at 25°C)	
	Range	Mean	Range	Mean	Range	Mean**	Range	Mean
Lucille	83-171	121	85-171	120	7.2-8.8	8.2	133-330	202
Matanuska	103-171	133	103-154	130	7.6-8.9	8.4	195-245	215

* Determined monthly with Model AL-36-WR Hach Kit.
** Calculated by dividing sum of values by number of measurements.

In 1973 dissolved oxygen concentrations were monitored in Matanuska and Lucille Lakes. This sampling was continued in 1974 to further evaluate O_2 patterns in a shallow and deep lake (Table 7). Since Matanuska and Lucille Lakes are very productive the biochemical oxygen demand is relatively high and rapid depletion of O_2 in deeper waters is evidenced during periods of restricted circulation.

Since Lucille Lake has a maximum depth of 20 ft and mean depth of only 5.7 ft, mixing occurs throughout most of the lake during the summer months. Even so, the lake has a history of low O_2 concentrations during winter months. Dissolved oxygen levels usually reach a low of 1.0-2.0 ppm by January. A sample collected on December 24, 1974 revealed oxygen levels were only 0.3 ppm at the surface. To evaluate whether this sample was representative of O_2 levels throughout the lake, 40 samples were collected at 300 ft intervals along a line traversing the length of the lake. Measurements, all taken within 1 m of the surface ranged from 0.2-1.1 ppm and averaged 0.4 ppm. Several open water spring areas were located which contained dense concentrations of coho salmon, Oncorhynchus kisutch. Samples taken from these spring areas revealed O_2 concentrations ranging from 2.4-7.0 ppm. Dissolved oxygen concentration declined rapidly to 1.6 ppm when sampling was conducted more than 10 ft away from the spring areas. This phenomenon may explain why coho salmon have survived during the past two winters when O_2 concentrations have averaged 0.6 ppm and 0.4 ppm at sampling stations throughout the lake.

In Matanuska Lake a vertical dissolved oxygen series has been collected on a monthly basis since November 1972. Samples were collected at 3 m intervals to the maximum depth at the sampling station (24 m). As previously mentioned complete mixing occurred during the fall of 1972. Oxygen depletion during the 1972-73 winter was evident only below 21 m. Mixing was incomplete during the spring of 1973 and by August 1, O_2 levels had declined to 0.6 ppm at 12 m. Mixing during the fall of 1973 was incomplete extending to only 12 m and by March 1974, O_2 levels were down to 1.5 ppm at 9 m. Spring overturn

Table 7. Seasonal Dissolved Oxygen Patterns for Two Matanuska Valley Lakes, 1973-74.

LUCILLE LAKE

Depth (m)	12/17	1/16	2/21	3/18	4/9	5/22	6/4	7/3	8/14	9/12	9/23	10/17	12/24
	ppm												
1	4.9	2.0	1.0	3.8	11.7	12.3	11.3	6.8	15.4	9.5	10.6	12.5	0.3
3	2.5	1.8	1.0	3.2	9.7	12.9	11.4	9.3	3.3	9.3	8.7	12.3	---
6	1.0	0.6	0.7	3.0	7.6	11.1	10.2	9.3	1.0	8.9	5.5	12.1	---
Ice (cm)	---	86.5	99.0	101.5	90.0	----	----	---	----	---	----	----	45.0
Snow (cm)	Trace	Trace	5.1	5.1	Trace	----	----	---	----	---	----	----	28.0

MATANUSKA LAKE

Depth (m)	2/27	3/20	4/9	5/13	6/10	7/8	8/19	9/3	9/20	10/8	10/24
	ppm										
1	5.0	5.6	4.7	10.8	9.9	10.2	9.1	9.6	10.2	8.1	7.2
3	4.5	5.2	5.4	10.7	11.0	10.4	9.1	9.6	11.1	8.1	7.0
6	3.5	3.2	5.5	10.0	12.8	12.8	8.6	9.4	9.9	8.0	6.9
9	2.4	1.5	2.0	3.7	2.0	5.5	14.2	18.3	10.0	7.9	7.0
12	0.9	0.7	0.6	0.4	0.0	0.0	0.0	3.6	0.0	7.4	6.8
15	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	6.4
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	6.4
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6
Ice (cm)	99.0	92.8	83.8	---	---	---	---	---	---	---	---
Snow (cm)	10.2	7.6	Trace	---	---	---	---	---	---	---	---

was again incomplete with no O_2 present below 9 m. Complete mixing to 24 m was evidenced during the fall of 1974 when a late freeze-up occurred and by October 24, O_2 levels had reached 4.6 ppm at 24 m.

It is apparent that dissolved oxygen can be a major factor in limiting fish production as evidenced in Matanuska Lake which for 15 months was devoid of O_2 in the bottom 15 m of water.

Lake Stocking Evaluations

Sampling of stocked lakes is conducted to evaluate and develop present stocking practices aimed at enhancing resident fish stocks.

In 1974, 22 stocked lakes were sampled under ice with variable mesh gill nets. As in the past, netting was directed toward determining growth of fish stocked the same year (age 0+) and the previous year (age I+). Catches of older age groups are usually too small to allow comparative analysis. The netting also permits a gross evaluation of relative fish abundance.

Substantial numbers of rainbow trout, Salmo gairdneri, from Ennis, Montana and Winthrop, Washington were utilized in the 1973 planting program. Ennis trout were planted in late June, 1973 as fingerling weighing 108/lb., whereas Winthrop fish weighed from 121-1178/lb. and were stocked a month later. Ennis and Winthrop trout were again planted in 1974 with the exception of Canoe, Reed and Tigger Lakes, which received experimental plantings of Alaskan stocks from Talarik Creek and Swanson River. Ennis trout stocked in 1974 were not evaluated at this time since they had been stocked in lakes as part of an experimental program whose population estimates will not be calculated until after one complete year of lake residency. Winthrop fish were stocked in late June, 1974 as fingerling weighing from 848 to 1,000/lb.

Gill net catch data and stocking histories are presented in Table 8. Samples taken approximately 16.5 months after introduction indicate that 1973 Winthrop plants obtained mean lengths of 258, 297, 313 and 328 mm in Long, Seymour, Rocky and Irene Lakes, respectively. Long and Seymour Lakes were stocked with fish weighing 1,178/lb. while Rocky and Irene Lakes were stocked with fish weighing 121/lb. All were stocked on July 26, 1973 except Long Lake which received its plant on July 6, 1973. The shorter average length of fish in Seymour Lake is probably due to the smaller size of stocked fish but in Long Lake it was a combination of size of stocked fish and competition from the re-infestation of large numbers of threespine sticklebacks, Gasterosteus aculeatus, by the spring of 1974. Average lengths of 1974 Winthrop plants after 5.5 months of lake residency ranged from 155 mm in Wishbone Lake to 204 mm in Matanuska Lake.

Only two Ennis trout from the 1973 Ennis plants were captured and these came from Long Lake. Ennis trout were also stocked in Knik, Ravine, Canoe and Matanuska Lakes in 1973 but no Ennis trout were captured in these lakes. This pattern had been previously reported by Watsjold (1973) when age I+ Ennis trout were not captured in any of the productive waters receiving this strain.

Table 4. Gill Net Results and Stocking Histories of Managed Lakes, Matanuska-Susitna Valleys, 1974.

Lake	Date Sampled	Species*	Number	Age Class	Length (mm) Range	Length (mm) Mean	Catch/ Net Hr.	Date Stocked	Total Number**	Per Lb.	Per Acre
Kepler	12/3/74	RT	94	0+	110-177	157	2.24	6/24/74	102,500 W***	975	1,770****
Bradley	12/3/74	RT	3	0+	143-152	147	0.15	6/24/74	102,500 W***	975	1,770****
Canoe	11/26/74	RT	1	II+	481	---	0.02	9/8/72	8,400 W	172	400
Irene	11/26/74	RT	8	I+	297-360	328	0.19	7/26/73	8,400 W	121	400
		RT	1	II+	419	---	0.02	9/8/72	8,400 W	172	400
Knik	12/13/74	RT	40	0+	132-210	170	0.90	6/24/74	37,500 W	975	740
		RT	4	II+	322-398	349	0.09	9/6/72	20,000 W	172	400
Matanuska	12/4/74	RT	154	0+	113-264	204	3.14	6/24/74	92,000 W	1,000	1,500
		RT	4	II+	376-448	409	0.08	9/5/72	21,200 W	172	340
Ravine	12/11/74	RT	13	III+	329-424	352	0.28	6/10/71	3,700 E	162	300
Reed	12/13/74	RT	4	III+	385-415	398	0.07	5/25/71	4,500 E	126	225
		RT	3	IV+	438-488	456	0.05	9/14/70	3,400 W	74	170
Rocky	12/6/74	RT	32	0+	139-202	161	0.68	6/24/74	33,000 W	975	560
		RT	3	I+	297-338	313	0.06	7/26/73	17,700 W	121	300
Seymour	12/13/74	RT	87	I+	254-332	297	1.81	7/26/73	257,600 W	1,178	1,120
Lower Bonnie	12/11/74	GR	1	0+	115	---	0.02	Wild	-------	---	---
		GR	2	I+	212-233	223	0.04	Wild	-------	---	---
		RT	4	IV+	233-328	261	0.09	9/14/70	12,200 W	74	120

Table [illegible]. [illegible] Gill Net Results and Stocking Histories of Managed Lakes, Matanuska-Susitna Valleys, 1974.

Lake	Date Sampled	Species*	Number	Age Class	Length (mm) Range	Length (mm) Mean	Catch/Net Hr.	Date Stocked	Total Number**	Per Lb.	Per Acre
Wishbone	11/27/74	RT	43	0+	134-175	153	1.4[illegible]	6/28/74	33,500 W	848	560
		RT	1	V+	500	---	0.02	7/17/69	7,500 W	517	120
Long (A)	12/4/74	RT	6	I+	225-283	253	0.12	7/6/73	41,700 W	1,178	560
		RT	2	I+	314-341	328	0.04	7/6/73	11,100 F	107	150
Lucille	10/23/74	SS	266	I+	233-460	333	4.43	7/2/73	55,500 G	525	150
Victor	11/21/74	SS	1	0+	116	---	0.04	7/9/74	2,700 S	227	200
		SS	28	I+	195-262	226	1.10	8/9/73	5,400 K	163	400
Echo	11/21/74	SS	11	0+	108-146	118	0.22	7/9/74	6,900 S	227	300
		SS	24	I+	201-302	241	0.48	8/9/73	9,200 K	163	400
Prator	12/6/74	SS	14	I+	146-187	165	0.29	8/10/73	15,000 K	163	150
		SS	11	III+	209-225	215	0.22	10/5/71	15,100 K	140	150
Finger	12/17/74	SS	29	0+	140-170	157	0.41	7/9/74	108,600 K	924	300
Loon	2/7/75	SS	80	I+	146-222	183	0.16	8/8/73	16,270 K	143	150
		SS	97	I+	153-200	173	0.13	8/8/73	16,135 G	133	150
Harriet	11/21/74	GR	13	0+	153-167	163	0.51	6/11/74	16,400 T	Fry	1,820
		GR	4	I+	240-295	259	0.16	6/15/73	5,400 T	Fry	600
Long (B)	12/11/74	GR	2	I+	221-232	227	0.04	Wild	-------	---	---
		GR	4	II+	288-318	303	0.09	7/3/72	40,000 T	Fry	390
		GR	1	III+	355	---	0.02	Wild	-------	---	---
		GR	2	IV+	395-410	403	0.04	Wild	-------	---	---

Table 8. (cont.) Gill Net Results and Stocking Histories of Managed Lakes, Matanuska-Susitna Valleys, 1974.

Lake	Date Sampled	Species*	Number	Age Class	Length (mm) Range	Length (mm) Mean	Catch/ Net Hr.	Date Stocked	Total Number**	Per Lb.	Per Acre
Meirs	12/3/74	GR	32	0+	147-177	162	1.27	6/12/74	8,400 T	Fry	530
		GR	14	I+	252-320	285	0.34	6/15/73	10,200 T	Fry	640
		GR	2	II+	350-352	351	0.05	7/3/72	5,000 T	Fry	310

* Key: RT=rainbow trout; SS = coho (silver) salmon; GR = Arctic grayling.
** Key: W-Winthrop strain; E-Ennis strain; K-Kodiak strain; T-Tolsona strain; G-Green River strain.
*** Key: Represents total plant stocked into both Kepler and Bradley Lakes.
**** Key: Density computed on total acreage of Kepler and Bradley Lakes.

Coho salmon growth and relative survival rates were evaluated in Lucille, Victor, Echo, Finger, and Loon lakes; and Prator Lake, which contains sticklebacks. Mean lengths of age 0+ coho in Victor, Echo, and Finger lakes were 116, 118, and 157 mm, respectively. Victor and Echo lakes were stocked on July 9, 1974 with fingerling weighing 227/lb. while Finger Lake was stocked on the same date but with fish weighing 924/lb. The larger size of the coho in Finger Lake may be attributed to rehabilitation of the lake during the fall of 1973, therefore no fish were present to compete with the fingerling.

Mean lengths of age I+ coho in the four single species lakes ranged from 173 mm in Loon Lake to 333 mm in Lucille Lake, whereas age I+ fish in Prator Lake averaged only 165 mm.

Harriet and Meirs lakes were stocked with Arctic grayling, Thymallus arcticus, fry on June 15, 1973 and June 11 and 12, 1974. Net sampling during the 1974 winter revealed that age I+ grayling had an average length of 259 mm in Harriet Lake and 285 mm in Meirs Lake. Age 0+ grayling averaged 163-162 mm, respectively, in Harriet and Meirs lakes.

Factors affecting growth and survival of fish in waters of varying productivity in the Matanuska-Susitna Valleys are not fully understood. It is apparent that certain lakes are extremely productive and it appears that any waters with conductance values less than 100 micromhos/cm generally yield much poorer gill net catches than those having greater electrolytec concentrations. Growth is also inferior in lakes deficient in dissolved substances. It does not appear that any individual factor, whether it be physical, chemical, or biological, consistently controls production. A simple ranking in a high-to-low order with respect to conductance, total hardness and total alkalinity explains some differences in production between different bodies of water but there are some lakes lower in the rankings that seemingly produce higher yields of fish. Ryder (1965) states that fish production is affected by three principal influences: the morphometric, edaphic, and climatic factors. When dealing with lakes in the same or similar climatic areas this third influence can be excluded, so from the first two factors the term morphoedaphic index (MEI) was brought into use. Simply stated, the MEI is total dissolved solids divided by mean depth. Ryder (1965) found that multiple regression of fish production on mean depth and total dissolved solids produced a highly significant relationship for the 23 lakes he studied. A complete historical review and evaluation on the MEI was conducted by Ryder et. al (1974).

Cursory fish production data, as defined by gill net sampling, suggests the MEI may be a useful indicator of productivity in waters of the Matanuska-Susitna Valleys. The incomplete nature of existing data, however, currently precludes an indepth statistical analysis of possible relationships. Subsequent segments of this investigation will be directed at evaluating the use of the MEI as a means of estimating potential production of all lakes in the study area.

Selectivity of Sampling Techniques

Gillnets:

The variable mesh gill net has long been one of the principle tools used by fishery workers in their management programs. Selectivity of these nets, however, has often been a subject of concern. It is commonly recognized that selectivity depends largely on such factors as filament diameter, mesh size, mesh color and types of construction materials. Smaller filament diameters commonly result in greater catches and mesh size is normally selective for certain size fish. Monofilament is generally more efficient than cotton or other multifilament materials. These are just a few of the factors which determine the selectivity of various experimental gill nets.

Many different types of variable mesh gill nets have been used to evaluate stocking programs in the Matanuska-Susitna Valley lakes. During this job segment three types of gill nets were used in the lake management program. This sampling gear will be referred to as white, green, and blue nets and are described in more detail in Table 9. The catches in each of these nets were evaluated to determine if any significant differences existed in the catches made by each type net and if the catches were representative of the size and relative abundance of the fish population present in a lake.

Table 9. Specifications of Variable Mesh Gill Nets Used in the Matanuska-Susitna Valleys, 1974.

Net Types*					
White		Green		Blue	
Mesh** Size (in.)	Diameter of Monofilament (mm)	Mesh Size (in.)	Diameter of Monofilament (mm)	Mesh Size (in.)	Diameter of Monofilament (mm)
1/2	0.29	1/2	0.32	1/2	0.15
3/4	0.30	-----	----	-----	----
1	0.30	1	0.29	1	0.24
1-1/2	0.34	1-1/2	0.36	1-1/2	0.30
2	0.32	2	0.33	2	0.36
		2-1/2	0.33	2-1/2	0.52

* Net types are based on the color of each floatline.
**Each mesh size is present in a 25-ft. panel.

Long Lake was first gillnetted in May, 1974 to evaluate differences in growth and survival of Ennis and Winthrop rainbow trout. Figure 3 shows the length frequency (range 105-280 mm) of the trout captured in blue and white nets. Trout caught in the blue net averaged 198 mm in length while those in the white net had an average length of 187 mm. This graph indicates that each net was selective towards specific size ranges with the blue net capturing the smaller (103-154 mm) and larger (194-271 mm) members of the population and the white ret catching primarily those trout in the 154-194 mm size range. This selectivity is explainable since the white nets contained a 3/4 inch mesh panel which was absent in the blue nets. Figure 4 shows the length frequency of Winthrop and Ennis trout and indicated averages of 157 and 257 mm in length, respectively. This graph shows that Winthrop trout had attained a size range that directly corresponded to the size range captured in the 3/4-inch mesh panel of the white nets. It is obvious that mesh sizes are extremely important in evaluating certain size ranges of fish. If the white nets had not been used in Long Lake the catch of Winthrop trout would have been negligible compared to Ennis trout and erroneous conclusions would have resulted. The efficiencies of the 1/2-inch mesh in both the blue and white nets greatly differ and are primarily due to the small diameter of monofilament (0.15 mm) used in the 1/2-inch mesh panel of the blue net compared to the large diameter (0.29 mm) used in the 1/2-inch panel on the white net.

Long Lake was again gillnetted in September, 1974 and trout were found to be present in the 170-351 mm length range. Figure 5 shows the length frequencies of the total catch in both blue and white nets. Trout captured in both nets had identical average lengths of 247 mm and were almost equally vulnerable to the 1-inch and 1-1/2 inch mesh panels present in both type nets.

The blue and white nets were again tested in Seymour Lake which contained only Winthrop trout having a size range of 201-360 mm in length. As in Long Lake, no apparent selectivity occurred between the nets when larger fish were present.

The rehabilitation of Johnson Lake provided an additional method for evaluating the effectiveness of gill nets on a population containing rainbow trout which ranged in length from 200-320 mm. Both blue and white nets were set prior to rehabilitation and the combined catch of 54 rainbow trout averaged 269 mm in length. A total of 168 rainbow trout also averaging 269 mm in length were recovered after treatment. Length frequencies of both samples were almost identical and marked fish present in the lake comprised 32% of the gill net catch and 33% of post-treatment recoveries. The data further substantiate the lack of bias of gill nets on fish populations containing only larger fish.

In Loon Lake, which was stocked with coho salmon in August, 1973 the white nets were compared to the green nets. Coho in Loon Lake ranged in length from 146-230 mm. The graph in Figure 6 shows a definite selectivity pattern with the white nets capturing smaller coho (146-196 mm) and the green nets catching primarily larger fish (194-225 mm). The white nets were very effective toward the smaller coho and as in Long Lake it was the 3/4 inch mesh panel that caught the majority of the fish. The green, like the blue net, did not contain the 3/4-inch mesh panel. The catch rate of the white nets (0.86 fish/net hr.) far exceeded that of the green nets (0.19 fish/net hr.) even though the green nets were fished for 236 hours and the white nets for only 191 hrs. The green and white nets were also interchanged between sites to reduce sampling error.

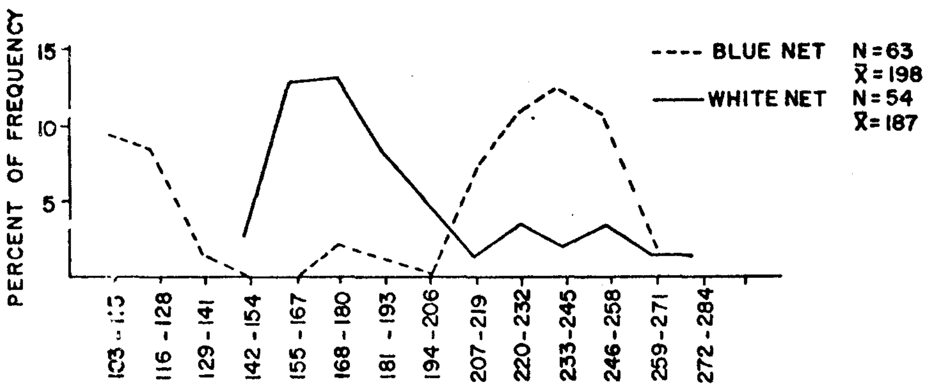

Figure 3. Length Frequency by Percent for Rainbow Trout Caught in Long Lake in Blue and White Variable Mesh Gillnets, May 1974.

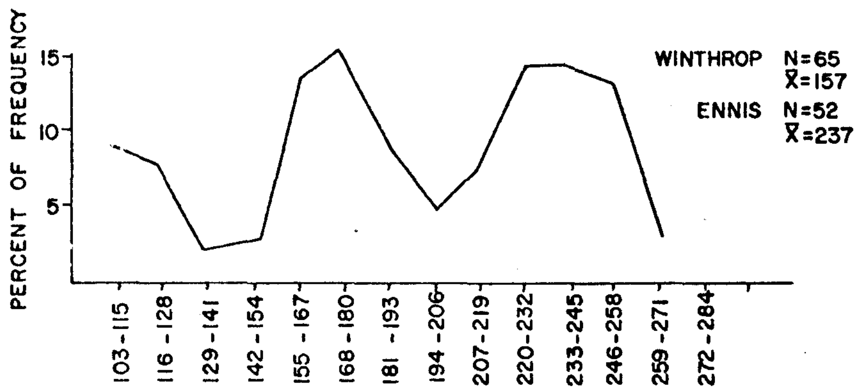

Figure 4. Length Frequency by Percent of Winthrop and Ennis Rainbow Trout Captured in Blue and White Variable Mesh Gillnets in Long Lake, May 1974.

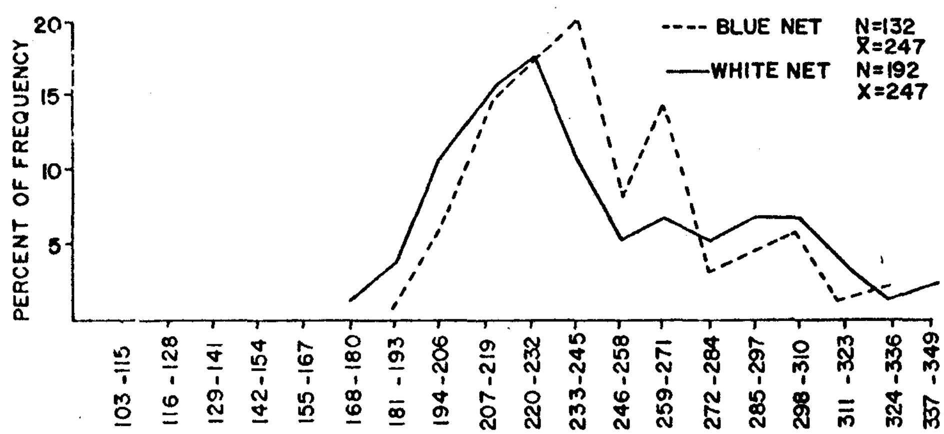

Figure 5. Length Frequency by Percent for Rainbow Trout Caught in Long Lake in Blue and White Variable Mesh Gillnets, September 1974.

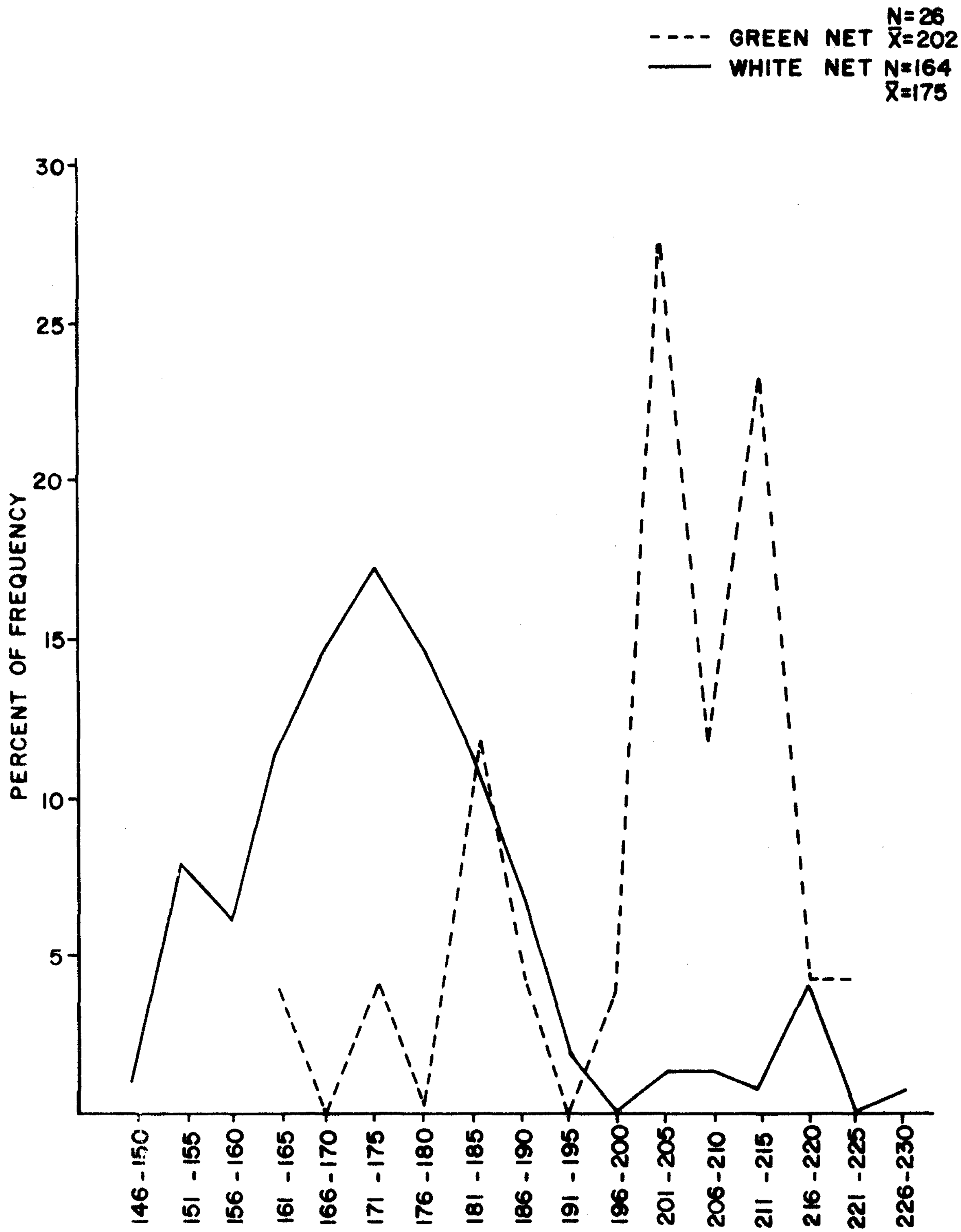

Figure 6. Length Frequency by Percent of Coho Salmon Caught in Loon Lake in Green and White Variable Mesh Gillnets, February, 1975.

Since gillnetting on stocked lakes is usually directed toward fish that are in their first and second year of lake residency, it appears very important that proper size mesh panels be represented in the nets to accurately evaluate relative growth and survival of fish populations.

Electroshocker:

The electroshocker is a relatively new method of assessing fish stocks in Alaskan waters. Electroshockers are a convenient method to obtain population estimates through mark and recapture methods. As with most types of sampling gear the electroshocker is size selective and this selectivity may vary depending on whether the unit is operated in lentic or lotic environments. Many investigators have evaluated electroshocking selectivity as it relates to population estimates. Klein (1967) found that in lakes the electroshocker recovered a high percentage of small rainbow trout and stated that smaller fish probably frequented shoal areas with greater consistency than larger fish. The problem of habitat preference in lakes is compounded since electroshockers are frequently effective to only 5 feet in depth and are operated along shorelines or on shoal areas. The opposite situation appears to prevail in streams. Cooper and Lagler (1965) found that in streams electroshockers tend to sample larger fish since they are more readily observed, therefore easier to capture. To cope with this problem of bias as related to size difference in susceptibility to capture, most investigators have resorted to obtaining population estimates based on three or four size groupings of the data. It has also been suggested that when fish are captured and marked with an electroshocker, recovery of marked fish should be by some other method, whether it be traps, gill nets or fisherman's catch. This would reduce the bias that might be introduced if an inordinate number of marked fish return to the narrow band of shoal water upon release and subsequently bias shocker recoveries of fish populations.

During the fall of 1974 comparisons of mean lengths and size ranges were made between fish captured with electroshockers and gill nets (Table 10). T-tests were conducted to determine if there was a significant difference between mean lengths of fish captured by both techniques. All t values, except for age I+ rainbows in Longmare Lake, were found to be more than 2.896 (degrees of freedom were from 24 to ∞), thus all were significant at the 0.01 probability level. These results show that the differences between mean lengths of fish captured by the two techniques were highly significant.

The length frequencies of fish caught with the electroshocker and gill nets in six lakes are graphed in Figures 7 through 12. On all lakes the electroshocker sampled smaller fish and failed to capture representatives of larger size groups present in the lakes. The gill nets failed to capture the smaller members in the population but this was primarily caused by the large filament diameter of the 1/2-inch mesh. The size selectivity of electroshockers resulted in an erroneous population estimate in Short Pine Lake. In Short Pine Lake rainbow trout were captured and marked using the electroshocker and then were recaptured to obtain a population estimate. Subsequent gill netting revealed that the larger members of the populations

Table [illegible]. Comparisons of Mean Length [illegible] Fish Captured by Electroshocker and Variable Mesh Gill Nets [illegible]

Lake	Species	Age	Electroshocking No.	Electroshocking Length (mm) Range	Electroshocking Length (mm) Mean	Gill-netting No.	Gill-netting Length (mm) Range	Gill-netting Length (mm) Mean
Longmare	RT	[illegible]	51	79-135	108	62	97-128	113
	RT	I+	38	195-287	236	167	183-292	241
	RT	Combined	89	79-287	[illegible]	229	97-292	206
Johnson	RT	---	26	260-324	287	32	265-330	[illegible]
Short Pine	RT (W-RV)*	I+	150	112-238	180	84	145-290	211
	RT (E-LV)**	I+	128	126-270	190	113	165-280	224
	RT (W,E)***	I+	278	112-270	184	197	145-290	215
Lucille	SS	I+	106	243-420	291	266	233-460	[illegible]
Upper Jean	SS	0+ and I+	42	120-248	154	238	120-373	[illegible]
Scout	SS	I+	25	145-216	185	111	168-301	216

* Key: W-RV, Winthrop strain with right ventral clip.
** Key: E-LV, Ennis strain with left ventral clip.
*** Key: W-E, Winthrop and Ennis strains combined.

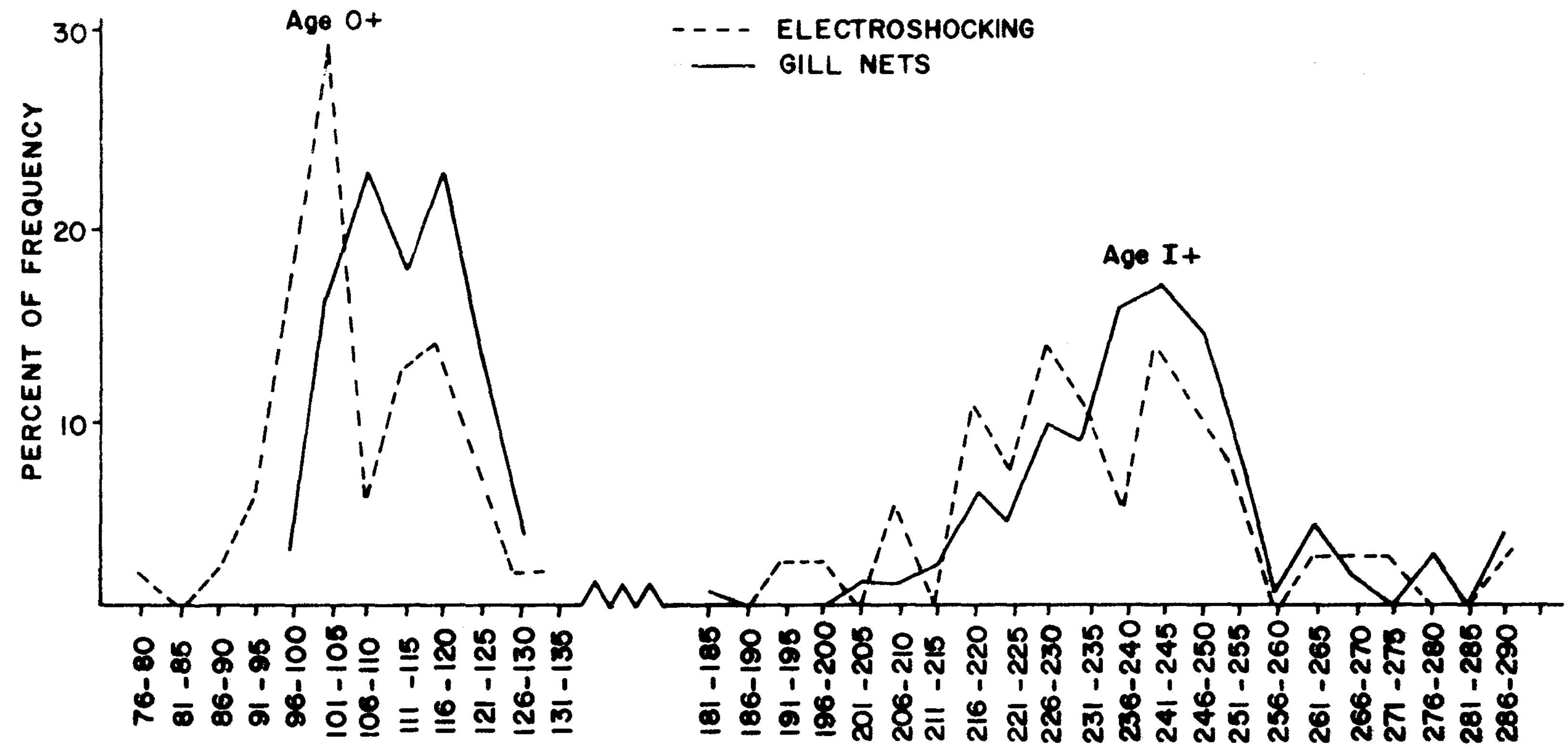

Figure 7. Length Frequency by Percent for Rainbow Trout Captured by Electroshocker and Gillnets in Longmare Lake, September 1974.

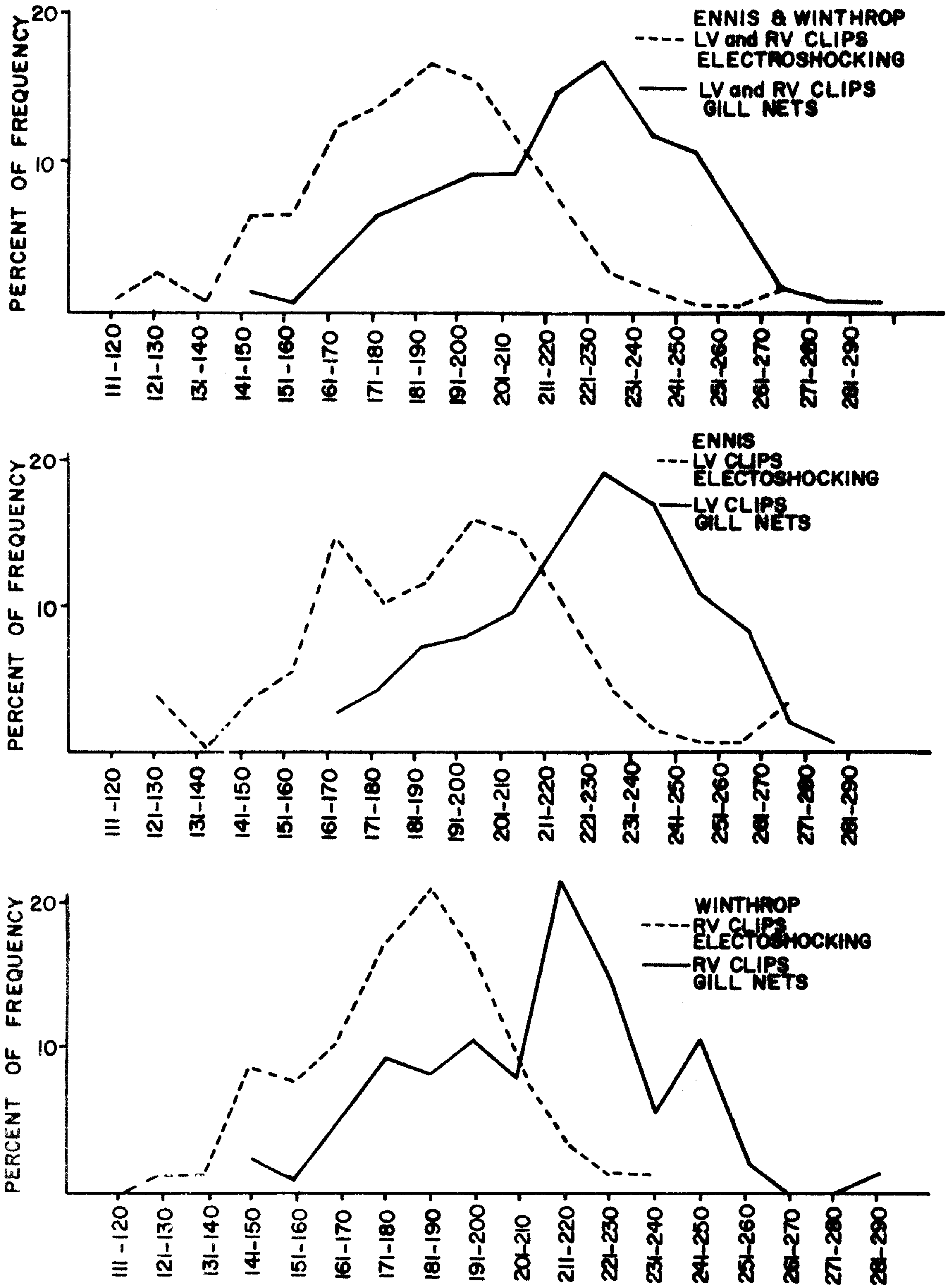

Figure 8. Length Frequency by Percent for Left and Right Ventral Finclipped Rainbow Trout Captured by Electroshocker and Gillnets in Short Pine Lake, June 1974.

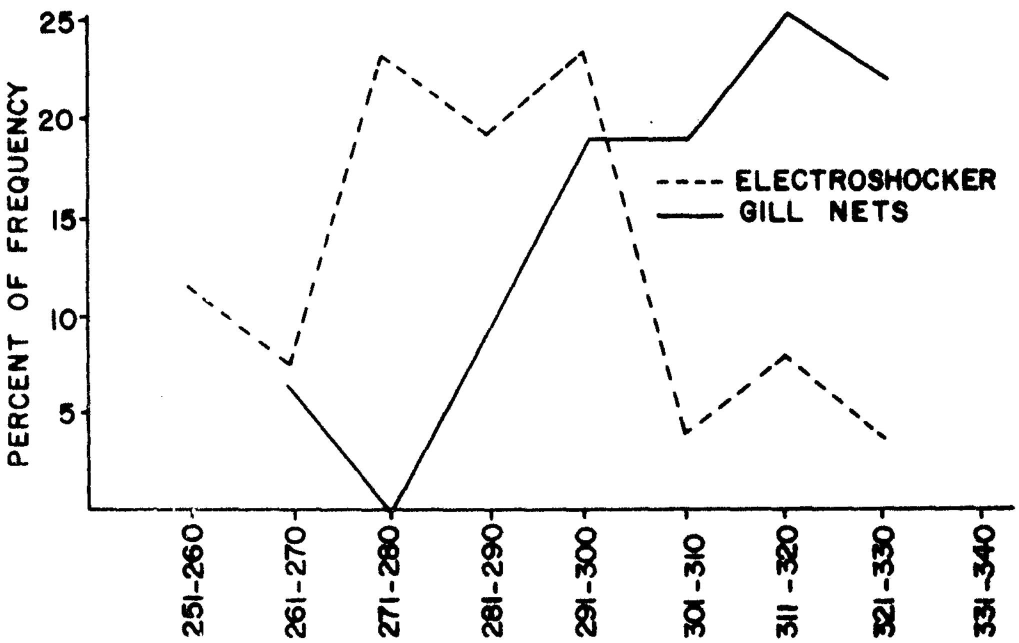

Figure 9. Length Frequency by Percent for Rainbow Trout Captured by Electroshocker and Gillnets in Johnson Lake, October, 1974.

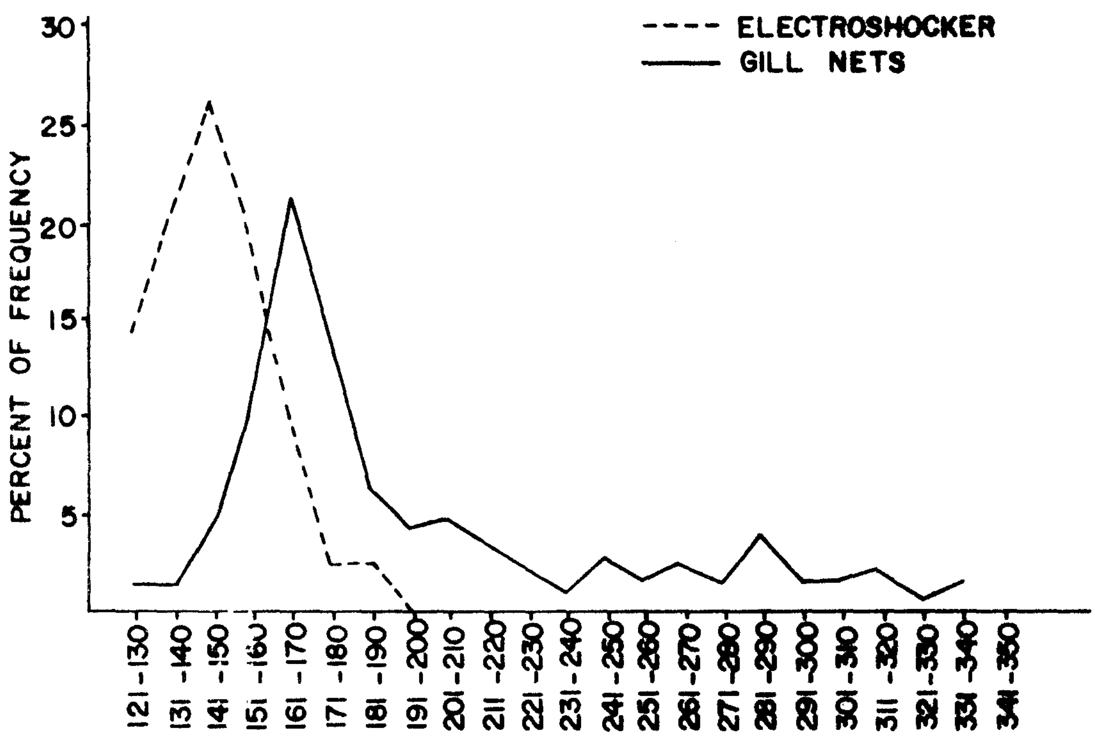

Figure 10. Length Frequency by Percent for Coho Salmon Captured by Electro-Shocker and Gillnets in Upper Jean Lake, October, 1974.

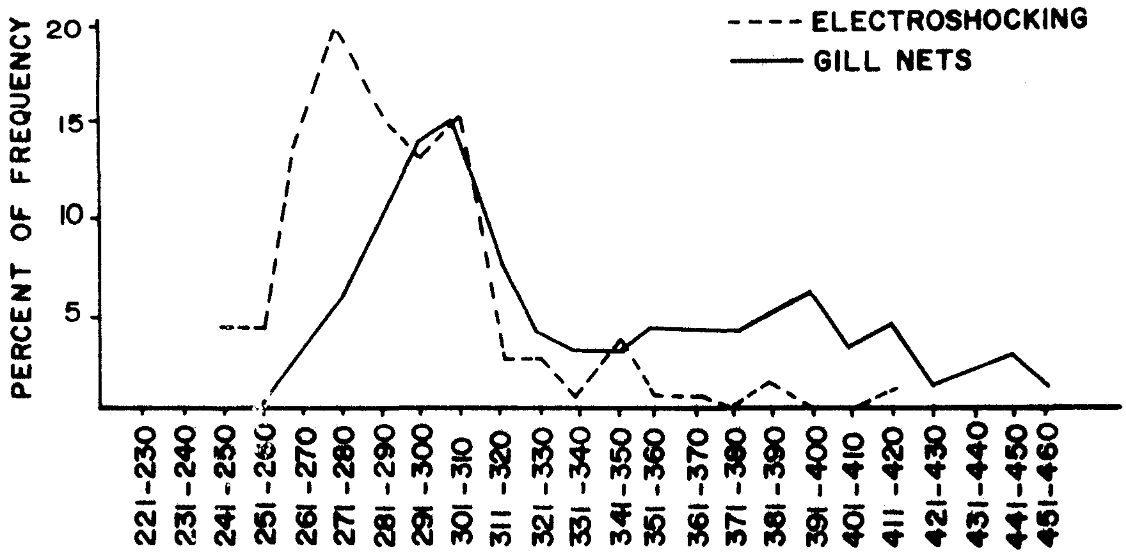

Figure 11. Length Frequency by Percent for Coho Salmon Captured by Electroshocker and Gillnets in Lucille Lake, October, 1974.

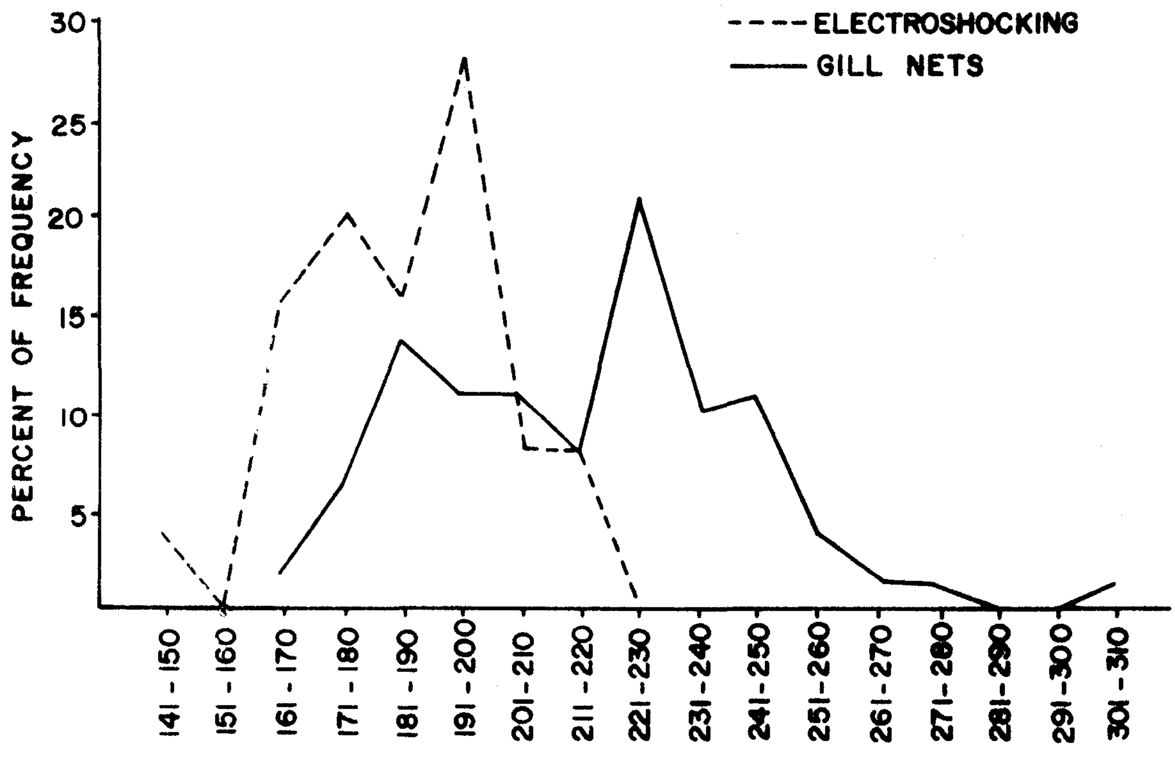

Figure 12. Length Frequency by Percent for Coho Salmon Captured by Electroshocker and Gillnets in Scout Lake, September, 1974.

were not captured by electroshocking (Figure 8). A segment of the population was therefore excluded from the estimate since fish in the larger size range were not represented by marked individuals.

Chinook Studies

Escapement surveys were conducted from July 24-August 5 in the Matanuska-Susitna Valleys, under excellent stream and weather conditions. A total of 3,600 chinook salmon, O. tshawytscha, were actually observed during escapement surveys. Watsjold (1974) found that during aerial surveys approximately 70% of the chinook were observed in alpine streams and 55% were observed in streams flowing through heavily forested areas. Based on these findings it was estimated that the 1974 chinook salmon escapement was 4,100.

With the exception of Portage Creek, all surveyed streams revealed 1974 escapements to be lower than in 1973 (Table 11). Comparable fixed wing aerial surveys were conducted on eight streams in 1972, 1973, and 1974, which resulted in actual observation of 437, 1,338, and 1,026 chinook, respectively.

The 1974 chinook escapement counts in Willow and Montana Creeks were substantially lower than in 1973 but about average when compared with the mean of the previous five year period.

The Prairie Creek chinook escapement accounted for most of the decline in the total 1974 chinook escapement. In 1973 a total of 4,190 chinook were counted, whereas in 1974 only 1,498 chinook were observed during escapement surveys.

On May 26 and 27, 1971 a total of 32,000 adipose clipped chinook smolts originating from Ship Creek were planted in Willow Creek. During the period from August 1-13, 1974 a concerted effort was made to check chinook (age 1.3) carcasses for fin clips. A total of 139 carcasses were measured and checked for fin clips. This sample represented 35% of the observed escapement into this system. Only two (1.4%) adipose clipped fish were observed. Any remaining adipose clipped fish should return as age 1.4 in 1975. The carcass sample ranged in length from 52-132 cm, with a mean of 112 cm. Males and females averaged 117 and 107 cm, respectively. Sex ratio of males to females was 1.0:1.1.

Coho Studies

Foot surveys were conducted in escapement index areas on six streams to estimate spawning coho salmon populations.

A summary of coho escapement counts in index areas is presented in Table 12. The 1974 escapement counts on all streams except Fish Creek were below the 1968-1973 averages, although counting conditions were excellent on all streams. Since the escapement count in the Cottonwood Creek index area was only to coho, an additional six miles of spawning areas were walked which represented almost the entire Cottonwood system. An additional 27 coho were observed during the surveys.

Table 11. Observed Chinook Escapement Counts, Susitna and Matanuska River Tributaries, 1969-1974.

	Fixed Wing Aerial Surveys						Helicopter Surveys	
	1969	1970	1971	1972	1973	1974	1973	1974
Goose Creek	--	---	--	---	---	41	---	---
Sheep Creek	--	---	---	101	444	202	482	---
Little Willow Creek	-	15*	---	99	233	109	371	139*
Kashwitna River (North Fork)	0	---	1	31	145	103	183	85*
Chunilna Creek	375	58*	5*	91	245	256	292	283
Byers Creek	---	---	5	7	1	0	---	---
Troublesome Creek	---	---	5	5	7	14	---	---
Indian River	---	---	---	35	110	102	122	---
Portage Creek		---	---	68	153	260	174	---
Chulitna River (East Fork)	---	---	---	---	41	41	42	---
Chulitna River (Middle Fork)	---	---	---	---	206	159	219	---
Little Susitna River	---	---	---	---	---	---	374	---
Prairie Creek	--	820	---	630	---	---	3,286	---
	Ground Surveys							
Willow Creek	290	640	165	370	1,074	402		
Montana Creek	150	161	14	317	527	280		
Moose Creek	--	126	40	21	36	32		
Prairie Creek	---	---	---	---	4,190	1,498		

*Poor Conditions

Table [illegible]. Numbers of Coho in Escapement Index Areas (Foot Counts), Upper Cook Inlet, 1968-1974.

	1968	1969	1970	1971	1972	1973	1974	Average 1968-73
Wasilla Creek	---	---	101	104	19	28	30	63
Cottonwood Creek	22	9	5	29	21	10	2	16
Birch Creek	125	112	206	138	69	106	49	131
Fish Creek	35*	852	176	141**	118	75	256	233
Meadow Creek	54	109	49	9	27	14	22	44
Question Creek	---	---	---	---	---	59	3	59
Total	236	1,112	537	421	254	292	362	

* Count made after peak of spawning.
** Due to high water a boat count was necessary.

Table [illegible]. Evaluation of Fish and Meadow Creeks Coho Index Areas, 1969-1974.

Year	Dates of Operation	Weir Counts	Fish Creek Index Area	% of Weir Count	Meadow Creek Index Area	% of Weir Count
1969	[illegible]	[illegible]	852	20.1	109	2.6
1972	[illegible]	709	118	16.5	27	3.8
1973	7/1-9/[illegible]	210	75	35.7	14	6.7
1974	7/8-9/[illegible]	1,154	256	22.2	22	1.9

An additional six miles of stream was also walked on Wasilla Creek to check for additional spawners. During this expanded survey only six coho were found.

In 1974, a total of 1,154 coho were enumerated through the Fish Creek weir between July 23 and September 6.

The weir on Fish Creek has allowed index area escapement counts of Fish and Meadow creeks to be evaluated against a known escapement. Table 13 shows the percent of the total weir count of coho that were counted in the two index areas. During the four years when evaluation has been possible the Fish Creek index area counts have varied from 16.5% to 35.7% of the run entering the Big Lake system and the Meadow Creek index area counts have varied from 1.9% to 6.7%. In 1969, 1972, 1973, and 1974 the Meadow and Fish creeks index areas (combined) have accounted for 22.7%, 20.3%, 42.4% and 24.1%, respectively, of the run passing through the Fish Creek weir. Watsjold (1974) suggested that the higher percentage counts in the index area in 1973 were related to the extremely low coho escapement (210) into the Big Lake system. From data collected to date, it appears that index counts are a valuable tool in evaluating escapement trends from year to year.

Access Activities

One of the most serious threats to the continued expansion of the area's sport fisheries is the subdivision of streambank and lakeshore properties. Recommendations regarding public fishing sites or easements were made to appropriate land managing agencies or private individuals. Considerable effort was expended toward purchase of a 114 acre tract within the Kepler-Bradley Lake Complex.

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